INFECTION CONTROL REVIEW

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DISCUSSION TOPICS

- Infection Control Principles
- Infections
- Antibiotic Resistance
- Latex Sensitivity
- Dental Unit Waterlines (DUWLs)

UNIVERSAL PRECAUTIONS

- Human blood/body fluids are treated as if known to be infectious for BBP
- Consideration of all patients as being infected with pathogens and therefore applying IC procedures to the care of all patients
- Treat every patient as though infected with incurable disease
- **THE SAME IC PROCEDURES ARE USED FOR ALL PATIENTS**

STANDARD-UNIVERSAL PRECAUTIONS

- Applied universally to all patients, regardless of infectious status, to reduce risk of transmission of bloodborne pathogens
- No change in treatment procedures for patients with HIV or hepatitis
- Additional precautions based on degree of exposure risk due to particular procedure and applied universally to all patients

TRANSMISSION-BASED PRECAUTIONS

- For patients with highly transmissible pathogens for which additional precautions are needed to interrupt transmission
- Used with Standard-Universal Precautions
- Three types
  - Airborne-TB
  - Droplet (>5 microns)-influenza
  - Contact-herpes

CHAIN OF INFECTION

- Pathogen
- Portal of entry
- Susceptible host
- Number of pathogens sufficient to cause infection

INFECTIOUS DISEASE DETERMINANTS

- Virulence (pathogenic properties)
- Dose (number of microbes)
- Resistance (body's defense mechanism)
- **I C PROCEDURES AFFECT DOSE**

TRANSMISSION IN DENTAL

- Direct contact with infectious lesions or infected saliva or blood
- Indirect transmission via transfer of microorganisms from contaminated object
- Spatter of blood, saliva, or nasopharyngeal secretions directly onto broken or intact skin or mucosa (droplet)
- Aerosolization-the airborne transfer of microorganisms (droplet)

MECHANISMS OF DISEASE SPREAD

- Patient to the dental team
- Dental team to the patient
- Patient to patient
- Office to the community (family members)

HANDWASHING

- Most important measure in reducing transmission risk of microorganisms
- When?
  - Before/after glove removal
  - After contact with blood or other potentially infectious materials (OPIM)
  - After contact with contaminated instruments or items

ENTRY ROUTES
Bloodborne Pathogens

- Ingestion
  - Swallowing droplets of saliva/blood spattered into mouth
- Mucous membrane
  - Droplets of saliva/blood spattered into eyes, nose, or mouth
- Breaks in skin
  - Directly touching microbes; catching spatter with saliva/blood on skin with cuts or abrasions; punctures with contaminated sharps

BLOODBORNE DISEASE TRANSMISSION EFFICIENCY

- Direct or percutaneous inoculation by a contaminated needle or sharp object
- Non-needle percutaneous inoculation (scratch, burn, dermatitis)
- Infectious blood or serum onto mucosal surface (nasal, ocular, intraoral)
- Other infectious secretions (saliva) onto mucosal surface
- Indirect transfer of infectious serum via environmental surface (spatter)
- Aerosol transfer of infectious serum

PROBABILITY OF INFECTION
Needlestick Injury

- HBV
  - 1.9%-40%
- HCV
  - 2.7%-10%
- HIV
  - 0.2%-0.44%

RECOMMENDATIONS

- Made by individuals or groups that have no authority for enforcement
- Centers for Disease Control (CDC)
  - Most IC procedures practiced in dentistry
  - No authority to make law
  - Most local, state, federal agencies based laws

RECOMMENDATIONS

- American Dental Association (ADA)
- Organization for Safety and Asepsis Procedures Research Foundation (OSAP)
- Association for the Advancement of Medical Instrumentation (AAMI)
- National Institute for Occupational Safety and Health (NIOSH)

REGULATIONS

- Made by groups that have authority to enforce
- State/local
- Environmental Protection Agency (EPA)
- Food and Drug Administration (FDA)
- Occupational Safety and Health Administration (OSHA)

REGULATIONS

- State/local
  - Medical waste management
  - Instrument sterilization
  - Spore testing
- EPA
  - Grant EPA registration number on product label for disinfectants (low/intermediate)
  - Management of hazardous solid waste

FDA

- Regulates the manufacturing and labeling of medical devices
- Assures safety and effectiveness of medical devices by requiring “good manufacturing practices”
- Does not control actual use
- Sterilizers, BI, CI, ultrasonic cleaners, gloves, masks, gowns, handpieces, sterilants

OSHA

- To protect the workers of America from physical, chemical, infectious hazards in the workplace
- 1991/92-Bloodborne Pathogens Standard
  - Employer responsibility to protect employee from exposure to blood and other potentially infectious materials (OPIM) in the workplace, proper care must be given if such exposure does occur

OSHA
Rules and Regulations

- Three standards
  - Bloodborne Pathogens Standard
  - Hazardous Communication Standard
  - General Safety Standard
    - Fire
    - Building
    - Equipment

OSHA Definitions

- Bloodborne pathogens
  - Pathogenic microorganisms that are present in human blood and can cause disease in humans
- Other potentially infectious materials (OPIM)
  - Human body fluids
    - Semen, vaginal secretions, CSF, unfixed tissues, SALIVA

OSHA Bloodborne Pathogens Standard

- Exposure control plan
- Methods of compliance
- HIV/Hep B
- Communication of hazards to employees
- Record keeping
  - Training record-maintained for 3 years
  - Medical record-maintained for duration of employment plus 30 years

OSHA Bloodborne Pathogens Standard

- Exposure control plan
  - Identify in writing all tasks, procedures, job classifications that involve occupational exposure
  - Create schedule to meet exposure control plan, inform employees, review, update annually (more often if workplace change)

OSHA Bloodborne Pathogens Standard

- Compliance methods
  - Implement universal precautions
  - Develop engineering/work practice controls
  - Provide personal protective equipment (PPE)
    - Insure use
  - Disposal of contaminated sharps
  - Regulated waste containers
  - Handling contaminated laundry

DEFINITIONS

- Engineering control
  - Act on hazard itself
    - Sharps container
- Work practice control
  - Alter manner in which task is performed
    - Recapping of needles
- PPE
  - Employer shall provide at no cost
    - Gloves, mask, eye protection, gown

SHARPS

- Infectious waste
- Penetrates skin
  - Injection needles, scalpel blades, sutures, instruments, broken glass, endo files, ortho wires, anesthetic cartridges
- Disposable
  - Placed in closeable, leak-proof, puncture resistant container
    - Color-coded, labeled with biohazard symbol

OSHA Biohazard Labels

- Regulated waster containers
- Refrigerators/freezers containing blood/OPIM
- Containers used to store, transport, or ship blood/OPIM
- Fluorescent orange or orange-red with biohazard symbol and word “biohazard” in contrasting colors
- Red bags or containers may be substituted for labels

WASTE DEFINITIONS

- Infectious-waste capable of causing an infectious disease
- Contaminated-item has contacted blood/other body secretion
- Hazardous-posing risk to humans or environment
- Toxic-capable of having a poisonous effect
- Medical-generated in diagnosis, treatment or immunization of human beings
- Each state formulates own list

OSHA Regulated Waste

- Liquid or semiliquid blood or OPIM
- Contaminated items that would release blood or OPIM in a liquid or semiliquid state if compressed
- Items that are caked with dried blood/OPIM
- Contaminated sharps
- Pathologic and microbiologic waste containing blood/OPIM

OSHA
Regulated Waste

- Sharps
- Teeth
- Gloves
  - Soaked dripping with blood
- Blood soaked or dripping material

OSHA Hazardous Communication Standard

- Material Safety Data Sheets (MSDSs)
- Container labeling
- Employee training
- Inventory list of hazardous chemicals
- Nonroutine tasks
- Exposure of other personnel (contractors)

MSDS

- Provided by manufacturers for products containing hazardous chemicals
- Employer must have MSDS specific for each hazardous chemical present in workplace
- Readily accessible to all employees
- Nine sections
  - Product information, hazardous ingredients, physical hazard data, fire/explosion data, health hazard information, reactivity data, spill/leak procedures, special precautions, special protection

STERILIZATION PRINCIPLES

- Sterilization-destruction or removal of all forms of life (key to IC program)
  - Kills spores (most heat resistant microbe)
- Disinfection-inhibition or destruction of pathogens, not all organisms
  - Spores are not destroyed
  - Chemicals applied to inanimate surfaces
- Antiseptic-antimicrobial to living tissue
- Cleaning-removing debris, reducing total
- Do not disinfect when you can sterilize

STERILIZATION

- Heat-most efficient, reliable method
- CDC
  - All critical and semicritical dental instruments that are heat stable should be sterilized routinely between uses by autoclaving, dry heat, or chemical vapor
- Monitoring
  - Physical
  - Biological
  - Chemical

BIOLOGICAL INDICATORS

- Main guarantee of sterilization
- Glass vials containing spore suspensions
- Bacterial spore-impregnated paper strips in glassine envelopes
- Autoclave/chemiclave
  - *Bacillus stearothermophilus*
- Dry heat/ethylene oxide
  - *Bacillus subtilis*
- Performed at least weekly, preferably daily

CHEMICAL INDICATORS

- Placed inside/outside packages
- Identify packs that have been processed through heating cycle
- Paper strips, labels, steam pattern cards impregnated with chemicals
  - Designed to change color when exposed to heat or chemical vapor
- Multiparameter indicator (integrator)
  - Time, temperature, steam

SPAULDING CLASSIFICATION

- CRITICAL
  - Touches bone or penetrates soft tissue, very high/high transmission risk- sterilization
- SEMICRITICAL
  - Touches mucous membrane, moderate transmission risk-sterilization or high-level disinfection
- NONCRITICAL
  - Touches intact skin, low transmission risk- intermediate to low-level disinfection, cleaning

CHEMICAL DISINFECTANT RESISTANCE

(From most to least)

- Bacterial endospores
- *Mycobacterium tuberculosis*
- Small nonlipid viruses (hydrophilic)
  - Poliovirus, rotavirus, Hep A
- Fungi
- Medium-sized lipid viruses (lipophilic)
  - HIV, herpes, Hep B
- Vegetative bacteria

CHEMICAL CLASS (PROCESS)

- STERILIZATION
  - Sterilant/disinfectant (prolonged contact time)
- HIGH-LEVEL DISINFECTION
  - Sterilant/disinfectant (short contact time)
- INTERMEDIATE-LEVEL DISINFECTION
  - Hospital disinfectant (tuberculocidal activity)
- LOW-LEVEL DISINFECTION
  - Nontuberculocidal hospital disinfectant

DISINFECTION

- Low-level
  - Does not kill spores or *M. tuberculosis*
- Intermediate-level
  - Kills *M. tuberculosis*, not necessarily spores
- High-level
  - Kills *M. tuberculosis*, kills some spores

SURFACE DISINFECTANTS

- CHLORINE COMPOUNDS
- PHENOLS
- IODOPHORS
- ALCOHOLS (poor cleaning agent)
- QUATERNARY AMMONIUM COMPOUNDS (Quats)
  - Alcohol-free is not tuberculocidal
  - Quat-alcohol is tuberculocidal

SURFACE DISINFECTANT SELECTION

- Must display EPA number on label
- Used in strict compliance with instructions
- Hospital-level-kills *Mycobacterium tuberculosis*
  - Tubercule bacillus-benchmark organism
  - Intermediate/high-level disinfection
    - Destroys all pathogens potentially threatening in dentistry

IDEAL DISINFECTANT

- Broad spectrum
- Fast acting
- Non toxic
- Hypoallergenic
- Not affected by physical factors
- Surface compatibility
- Residual effect
- Easy to use
- Odorless
- Economical

HIV/AIDS CASES

- Through June 1998-665,357 AIDS cases
- From 1995-96
  - AIDS defining opportunistic illnesses reduced by 7%, deaths by 25%
    - Due to combination antiretroviral therapy
- Tx advances-more people living with AIDS
- 1998 ADA meeting
  - 1,219 tested, 0 HIV-positive
  - Low occupational transmission risk in dentistry

HIV Transmission

- Blood
- Bloody body fluids
- Blood products
- Semen
- Vaginal secretions
- Breast milk

HIV Exposure

- Percutaneous injuries
  - Needle stick
  - Cut
- Mucous membrane
  - Eye
  - Nose
  - Mouth
- Skin

HIV Risk

- Occupational exposure
  - Percutaneous-0.3%
  - Mucous membrane-0.1%
  - Skin-less than 0.1%
- Risk varies
  - Amount of blood
  - Amount of virus in blood
  - Time
  - Whether postexposure prophylaxis (PEP) was administered

HIV Studies

- CDC documented cases
  - 52 occupation acquired infections among health care workers in US
- PEP
  - Treatment with zidovudine (AZT) after percutaneous injury exposure in HCWs has resulted in a 81% risk reduction

EXPOSURE
Protocol

- Immediate tx of exposure site
- Report exposure to designated manager
- Referral to healthcare professional
  - Assess the risk, determine if exposure incident
  - Counsel about tx recommendations
  - Monitor side effects of tx
  - Determine if infection occurs
- Discuss with source individual
- Follow current recommendations of CDC
- Maintain confidentiality

HIV

Postexposure Prophylaxis (PEP)

- Basic (4 weeks duration)
  - Zidovudine (AZT) plus Lamivudine (3TC)
- With increased risk or suspected resistance
  - Add Indinavir/Nelfinavir
- Start 1-2 hours after exposure
- Rapid screening test called SUDS by Murex
- Follow-up
  - 0, 6 weeks, 12 weeks, 6 months
  - CBC, kidney/liver function tests (0, 2 weeks)

PEP
Side effects

- Nausea
- Vomiting
- Diarrhea
- Headaches
- Jaundice
- Kidney stones
- Dehydration

HEPATITIS C (HCV)

- Formerly called non-A, non-B hepatitis
- Now affects 4 million Americans
- Will triple in next 10-20 years
- Kills 24,000 Americans per year
- "**SLEEPING GIANT AWAKENED**"
- **OCCUPATIONAL RISK FOR HCWs**

HCV

- Major cause of chronic liver disease (85%)
- Most common cause of liver transplant
- Transmission associated with direct percutaneous exposures to blood
- No vaccine due to ability to mutate upon replication
- No postexposure prophylaxis recommended
  - IG, antiviral agents, alpha interferon
- Rebetron (Rebetol and Intron A) for chronic cases

HCV
Risk Factors

- Healthcare workers (HCWs)
- Patient with blood transfusion before 1990
- IV drug users
- Hemodialysis patients
- Infants born to infected mothers
- Multiple sex partners

HCV Transmission

- Bloodborne pathogen
- USE STANDARD-UNIVERSAL PRECAUTIONS TO PREVENT TRANSMISSION

HCV
Acute Infection

- Incubation period-two weeks to six months
- HCV RNA detected in blood in 1-3 weeks
- 60-70% of patients have no overt symptoms
- Some patients experience
  - Flu-like symptoms
  - Jaundice
  - Abdominal pain
  - Loss of appetite with nausea/vomiting
  - Fatigue

HCV
Chronic Infection

- 85% become chronically infected
- Progresses at very slow rate
  - Without signs or symptoms for 20 years
- Symptoms develop with advanced liver dx
- Chronic HCV
  - No resolution within six months after infection
- 20% will develop cirrhosis
- Associated with increased risk of liver CA

HCV
Post exposure Policy

- Baseline anti-HCV testing for source
- Person exposed
  - Baseline and follow-up (six months) for anti-HCV and ALT activity
  - Confirmation by supplemental anti-HCV testing of all anti-HCV results by EIA
- EDUCATION OF HCWs

HEPATITIS B VIRUS (HBV)

- 100 times more contagious than HIV
- Infects over 200,000 per year in US
- Results in 5,000 deaths per year in US
- 1.5 million chronic carriers in US
- Dental
  - Risk from contaminated blood/saliva
    - 40% are asymptomatic

HBV

- Increased spread
  - Population growth, foreign travel, emigration, personal lifestyle
- High-risk factors
  - Sexual activity with multiple partners
  - Sharing needles/razors
  - Living in households with infected person
  - From mother to infant during birth

HBV

- Symptoms imitate the “flu”
  - Loss of appetite
  - Fatigue
  - Stomach cramps
  - Vomiting
  - With or without jaundice

HBV

- No treatment or cure
- Vaccine available since 1982
  - Three injections over 6 month period (all ages)
  - Critical for healthcare workers
  - Administered to 20 million in US and 500 million worldwide

CDC

- Vaccine does not cause
  - Chronic illness
  - Multiple sclerosis
  - Chronic fatigue syndrome
  - Rheumatoid arthritis
  - Autoimmune disorders
  - Hepatitis B
  - Side effects-soreness, fever

TUBERCULOSIS

- Risk to dental team is low
  - Biggest risk-undiagnosed TB pt
- Need prolonged exposure
  - Brief contact-little risk
- No studies have demonstrated generation of droplet nuclei containing *Mycobacterium tuberculosis* during dental procedures
- Techniques to reduce numbers of nuclei are effective in preventing transmission

TB CONSIDERATIONS

- Minimize time in dental clinic
- Have pt wear mask, cover mouth/nose during coughing and sneezing
- Suspend elective dental tx until cleared
- Emergency care-TB isolation procedures
  - Relieve patients chief complaint
  - Utilize respiratory protection
- Recommend referral to medical center with TB isolation room
- DHCWs with symptoms
  - Immediate eval, terminate work, start therapy

TB CONSIDERATIONS

- Periodic risk assessment-for IC guidelines
  - Policy for detection and referral-active cases, cases requiring emergency care
  - Education, counseling, screening of DHCWs
- Medical history
  - Take accurate hx-symptoms
    - Chronic cough, bloody sputum, night sweats, weight loss, anorexia, fever
- Positive skin test without symptoms does not indicate active infection in most cases
- Refer for medical eval with symptoms

RECOMMENDED VACCINES Healthcare Workers

- Hepatitis B
- Measles, Mumps, Rubella
- Influenza
- Tetanus-diphtheria
- Poliovirus
- Varicella
- Hepatitis A, Anthrax (military)

MICROORGANISMS

- Many live in or on the human body
- Live in balance with other organisms to maintain health
- Colonization
  - Presence of microorganisms at a body site not associated with active invasion of the host
- Infection
  - Condition in a host resulting from presence and invasion by microorganisms

ANTIMICROBIAL RESISTANCE

- Increased public awareness
  - Media reports
- Topic of discussion
  - Scientists
  - Health professionals

INFECTIOUS DISEASES

- Recently seen reemergence of infectious diseases with acquired resistance to antibiotics
  - Serious health threat in US/worldwide
  - Growing problem in nosocomial and community-acquired infections
- From 1980-1992-death from infectious diseases has increased by 58%
- Complacency regarding infectious dx

REEMERGENT MICROBES

- Growing concern with reemergent and recently discovered microorganisms
  - Bacteria, viruses, fungi, protozoa
- Witnessing increased outbreaks
  - Drawn media attention
  - HIV, EBOLA, HANTAVIRUS, CHICKEN VIRUS, MONKEY HERPES VIRUS, E. COLI, CRYPTOSPORIDIUM, FLESH-EATING BACTERIA

RESISTANT ORGANISMS

- *S. pneumoniae*
- *S. aureus*
- MRSA
- VRSA
- VRE
- Candida
- Herpes simplex
- MDR-TB
- HIV

RESISTANT ORGANISMS

- Treatment options
  - Limited
  - Unavailable
- DEATH
- HAVE THE BUGS OUTSMARTED US?

CONCERN

- Potential for serious infections
  - Resulting in morbidity/mortality from treatment failures
- Increase in length of hospital stays
- Increase in health care costs

ANTIMICROBIAL RESISTANCE

- Medicine has reached the crossroads
- Development of “super bugs”
  - Highly resistant to antibiotics
  - Major problem in clinical treatment
  - MAY BECOME RESISTANT TO ALL AVAILABLE ANTIMICROBIALS

DENTAL PROFESSIONALS

- Cognizant of this issue
- Impact dental facilities
  - Address treatment considerations
  - Diminishing effectiveness of antibiotics
  - Management of compromised patient
  - Potential risk from accidental occupational exposure

RESISTANCE

- Withstand the presence of a drug
- Can develop gradually or suddenly
- Usually due to genetic events-mutants
- Events are random and or universal
- Antimicrobial therapy
  - Selects resistant mutant organism
  - Mutant proliferates-predominant form

HOW?

- Misuse of antibiotics
- Unnecessary or incorrect use (viral)
- Incorrect dosage
- Incorrect route of administration
- Inappropriate duration of therapy
- Inappropriate choice of drug

HOW?

- Poor infection control practices
  - Failure to handwash
- Patients
  - Pressure for RX for every ailment
  - Failure to complete RX
    - Allows stronger organism to survive
  - Stockpiling
    - Use to treat common cold
    - Multiple exposures to same antibiotic
    - Sharing of medications between family

HOW?

- OTC antibiotics in developing countries
- Antimicrobial use in animal husbandry
  - Placed in feed to decrease infections and accelerate growth
    - Resistant strains in food chain
- Increased travel
  - Fosters spread of disease
- Commercial movement of produce
  - Redistributes microorganisms
- Microbes ability to mutate

INAPPROPRIATE INFECTION CONTROL

- Not wearing gloves
- Not washing hands
- Not changing gloves
- Person-to-person transmission
  - Hand contact
  - Environmental surfaces/equipment

ANTIBIOTIC RESISTANCE

- Bacterial genetic plasticity
- Abuse and misuse of antibiotics

BACTERIAL RESISTANCE

- Produce enzymes inactivating the drug
- Prevents drug attachment
- Prevents drug penetration
- Pumps out the drug
- Changes the metabolic pathway

ANTIBIOTIC MECHANISM

- Bacteriostatic
- Bactericidal
- Inhibition of cell wall synthesis
- Alteration of cell membrane permeability
- Alteration in synthesis of cellular components
- Inhibition of cellular metabolism

SOLUTIONS

- Judicious antibiotic use
- Public education
- Surveillance
- Infection control
- Vaccinations
- Pharmaceutical industry
- Legal reform

SOLUTIONS

- Antibiotic use committee
  - Monitor antibiotic use
  - Feedback to providers
  - Educate based on scientific data
  - Restrict certain antibiotics
    - Based on potential resistance, costs, adverse reactions
- Congress
  - Increased funding for antimicrobial resistance, surveillance, research

NON-EFFECTIVE

- Noncompliant patient
- Insufficient, irregular, or wrong dosage
- Drug not reaching site
- Inactivation of antibiotic by host
- Inadequate absorption
- Failure to treat infection locally
- Nonbacterial infection
- Resistant to antibiotic

SUMMARY

- Constant vigilance
- More patients with resistant strains
  - Require identification/sensitivity profile
- Once thought to be medical issue only
- Now involves dentistry
  - Symptomatic infection
  - Carrier

SUMMARY

- Colonization
  - More common than clinical infection
  - More difficult to eliminate
- Judicious use of antibiotics
- Strict adherence to infection control
- Reverse trends must be expanded

HEALTHCARE PROVIDERS

- Restraint in antibiotic use
- Do not allow patients to dictate use
- Must avoid antibiotics on demand
- Use narrow-spectrum when indicated
- Resist temptation to RX “just in case”
- Avoid RX for inflammatory responses, viral infections, minor surgery cases

LATEX ALLERGIES

- Virtually unknown 20 years ago
- Reached “epidemic” proportions
  - Among HEALTH CARE WORKERS (HCWs)
- Major occupational health problem
- 3-17% of exposed HCWs are at risk
- 1.4 million of 8.2 million US HCWs are latex sensitive

LATEX CONTAINING PRODUCTS

- Wide variety of products (40,000)
  - Medical supplies, PPE, household objects
- Most people have no health problems
  - 1% of general public sensitive
- If latex sensitive-BE AWARE

LATEX REACTIONS

- Irritant dermatitis
- Type IV Hypersensitivity
- Type I Hypersensitivity

IRRITANT DERMATITIS

- Up to 50% of HCWs affected
- NOT A TRUE ALLERGY
- Due to contact with substance that challenges skin
- Epidermis affected
  - Reddened, dry, irritated, cracked
- Symptoms stop at glove cuff

IRRITANT DERMATITIS

- COMMON FACTORS
  - Frequent handwashing with certain agents
  - Failure to completely rinse
  - Irritation from powder in gloves
  - Excessive perspiration when wearing gloves
  - Failure to dry hands thoroughly after rinsing
- CAN BE CAUSED BY LATEX OR SYNTHETIC GLOVES

TYPE IV HYPERSENSITIVITY

- Most common latex allergy
- Delayed contact reaction
- Limited to contact areas
- Does not involve entire body (poison ivy)
- Results from exposure to chemicals
- Produces an immune response
  - Sensitized lymphocytes (T-cells) to chemicals

TYPE IV HYPERSENSITIVITY

- Begins 24-48 hours after contact
- Red, itchy rash (vesicles, blisters)
- Up to 4 days to heal (necrosis, scabbing)
- Can become a chronic problem
- CAN BE CAUSED BY LATEX OR SYNTHETIC GLOVES
  - Accelerators/antioxidants
    - Residual/extractable amount left

TYPE I HYPERSENSITIVITY

- Most serious reaction
- Due to latex protein components
- Amount of exposure needed is not known
- Reaction begins within minutes of exposure
  - IgE mediated response (cat reaction)
  - Mild-skin redness, hives, itching
  - Severe-runny nose, sneezing, itchy eyes, scratchy throat, asthma, shock

TYPE I HYPERSENSITIVITY

- Most severe manifestation occurs through
  - AIRBORNE ALLERGEN
- Latex proteins adhere to powder particles
  - Proteins remain suspended in air bound to powder
  - PARTICLE AEROSOLIZATION

TREATMENT

- NO CURE for latex allergy
- Mild symptoms and recognized early
  - Continue working with minor modifications
- Severe symptoms
  - Difficult to provide safe work environment
- PREVENTION, AVOIDANCE, SYMPTOMATIC TREATMENT

ANAPHYLAXIS TREATMENT IMMEDIATE STEPS

- Stop allergen exposure
- Administer epinephrine
  - 0.01 ml/kg of aqueous 1:1000 epi (IM/SC)
  - Maximum dose 0.3 ml
  - Repeat every 15 minutes, up to 3 doses
- Give oxygen
- Monitor airway and blood pressure

ANAPHYLAXIS TREATMENT INTERMEDIATE STEPS

- Administer IV fluids
- Give histamines
  - Benadryl (25-50 mg), Cimetadine (300mg)
- Give corticosteroids
  - Hydrocortisone (250 mg IV), Methylprednisolone (50 mg IV)
- MAINTAIN BASIC LIFE SUPPORT
- TRANSPORT TO ER ASAP

DENTAL OFFICE PREPARATION

- Latex-free resuscitation equipment
- Ensure operatory properly cleaned
- Synthetic exam gloves
- Non-latex substitutes (prophy cups, rubber dam, BP cuff, tourniquet)
- Non-latex stoppers in injection vials
  - Single use glass ampule of lidocaine
  - Injected with latex free syringe

DENTAL OFFICE PROCEDURES

- First patient of the day
- Room close to entrance
- No latex in room
- Room set-up with non-latex gloves
- Instruments handled with non-latex gloves
- Non-latex kits

DENTAL UNIT WATERLINES (DUWLs)

- Suddenly a public concern
- Is it safe for public consumption?
- News media has become interested
- Public begins to question safety
  - Florida HIV transmission
  - Dental handpiece sterilization in 1992

INTRODUCTION

- Some studies have shown
  - 90% of tested dental units deliver grossly substandard water
- DUWL
  - Optimal breeding ground for microbes
- Most inhabitants are opportunistic
- NO CURRENT EVIDENCE OF WIDESPREAD PUBLIC HEALTH

BIOFILMS

- DENTAL PLAQUE most studied example
- Forms on walls of tubing in dental unit
  - Delivers water for high-speed handpiece, air/water syringe, ultrasonic scaler
- Type of “plaque” inside DUWLs
  - Causes infection of water delivery system

DUWLs
What

- DUWL contamination
  - Slime producing bacteria, fungi, protozoans
  - Colonize/replicate on interior surface of waterline tubing
  - Forms biofilm
    - Adherent heterogeneous microbial accumulations

BIOFILMS

- Develops in response to adverse environmental conditions
- Strategy to optimize survival
- MOST COMMON CAUSE OF CONTAMINATION IN DUWLs
- Presence of
  - *Pseudomonas*
  - *Legionella*
  - Nontuberculous *Mycobacterium*

CURRENT GUIDELINES

- Currently no laws or regulations
- Proposed federal regulation-500 CFU/ml for drinking water
- CDC
  - Sterile water when cutting bone
  - Flush lines
  - Never intended to control biofilm

CURRENT GUIDELINES

- 1995 ADA-statement of DUWLs
  - Challenged industry to produce systems to reduce bacterial to 200 CFU/ml
- 200 CFU/ml
  - Goal to industry to bench mark progress
  - Hemodialysis units-decreased infections
- Neither CDC or ADA require specific action by DHCWs

INFECTION CONTROL PROCEDURES

- Flush waterlines
  - Removes pt fluids
- Minimize spray/spatter
  - Use high-volume evacuation
- Barriers-rubber dam, mask, eyewear
  - Reduces contact, aerosols
- Separate water system
  - Quality water source, disinfection
- Chemical disinfection
- Filters

AVAILABLE METHODS

- Flushing waterlines
- Daily draining and air purging
- Independent water reservoir system
- Periodic/continuous chemical germicides
- Point-of-use filters
- Sterile water delivery systems
- Water purifiers
- COMBINATION OF METHODS
  - FDA clearance

GOAL

- Eliminate/reduce exposure to microbes
- All DHCWs have a responsibility to reduce possible contact
- Improving the quality of water
  - Maintains high quality of patient care
  - Staff protection

ADA INTERIM RECOMMENDATIONS

- Flush for 2 minutes at beginning of day
- Flush for 30 seconds between patients
- Follow manufacturer’s instructions for proper maintenance
- Consider commercially available system
- Use sterile water for surgery

HOW CAN I IMPROVE WATER QUALITY?

- Utilize sterile solution for surgical irrigation
- Educate and train dental health care workers on treatment measures
- Monitor scientific and technological developments to identify improved approaches
- Cooperate with dental industry to develop and validate standard protocols for maintenance/monitoring

HOW CAN I IMPROVE WATER QUALITY?

- Always consult with manufacturer before initiating any waterline treatment protocol
- Flush lines for several minutes at beginning of day, 20-30 secs between patients
  - Use sterilized handpieces, syringe tips
- Do not heat water-augments biofilm
- Consider separate water reservoir system
  - Control quality of source water
  - Avoid interruption in dental care during “boil water” notices by local health authorities

QUESTIONS